UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8, MONTANA OFFICE
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HELENA, MONTANA 59626

Ref: 8MO

June 29, 2011

Ms. Bobbi Lacklen
Kootenai National Forest
31374 U.S. Highway 2 West
Libby, Montana 59923-3022

and

Ms. Emily Corsi
Montana Dept. of Environmental Quality
P.O. Box 200901
Helena, Montana 59620-0901

Re: CEQ 20110149; Troy Mine Revised Reclamation Plan DEIS

Dear Ms. Lacklen and Ms. Corsi:

The Environmental Protection Agency (EPA) Region VIII Montana Office has reviewed the Draft Environmental Impact Statement (DEIS) for the Troy Mine Revised Reclamation Plan in accordance with EPA responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Section 309 of the Clean Air Act directs EPA to review and comment in writing on the environmental impacts of any major Federal agency action. EPA's comments include a rating of both the environmental impact of the proposed action and the adequacy of the NEPA document.

The EPA is generally pleased with and supports the mitigation measures added to the proposed action with the preferred alternative for the Troy Mine Revised Reclamation Plan (Agency-Mitigated Alternative). However, we do have comments and questions regarding the revised reclamation plan alternatives and the environmental impact analysis and disclosure, which are identified and discussed below and in our enclosed detailed comments. We are particularly concerned regarding the long-term pollutant removal effectiveness associated with the plan to discharge mine water draining from the underground workings to the decant ponds within the tailings impoundment after mine closure.

The DEIS states that mine water would be treated at the decant ponds through "natural attenuation mechanisms" as the water infiltrates, allowing metals concentrations to attenuate within the soils. Mechanisms for attenuating metals (removing them from groundwater) are stated to include dilution, precipitation, adsorption, and co-precipitation. It is further stated that the effectiveness of the natural attenuation mechanisms in treating mine water has been substantiated through monitoring of water at the tailings impoundment for the past 30 years as well as through studies directed at understanding the geochemical processes that occur in the underlying soils and groundwater system, and that the Agency-Mitigated Alternative would comply with the Clean Water Act and the Montana Water Quality Act.

The EPA acknowledges that there is empirical evidence that infiltration of mine water into groundwater beneath the Troy Mine tailings impoundment and decant ponds have apparently not resulted in elevated levels of copper and other metals in groundwater downgradient from the tailings impoundment or in Lake Creek (which is hydrologically connected to the groundwater beneath the impoundment). However, we are concerned that there may be a finite capacity for metals removal and/or immobilization, and/or that geochemical conditions may change over time reducing effectiveness of the removal/immobilization mechanisms, or that metals immobilized as precipitated metal compounds in decant pond sediments and groundwater have potential to become re-mobilized at some point in the future.

DEIS Appendix I states that the longevity of the natural attenuation mechanisms is dependent on the duration of the geochemical conditions conducive to attenuation and to the capacity of the tailing impoundment/aquifer sediments to continue to uptake metals. It concludes that the mineral precipitation and co-precipitation mechanisms are <u>expected to last indefinitely or in perpetuity as long as geochemical conditions remain similar to current conditions. The adsorption mechanisms are conservatively estimated to last a minimum of 600 years</u>. However, it is also acknowledged that there are limitations and uncertainties regarding the long-term effectiveness of the natural attenuation mechanisms, including:

1. The lack of actual post-closure mine water for evaluation;
2. The lack of the analysis of several metals in some previous investigations;
3. The very low or non-detectable concentrations of some metals;
4. The assumption of chemical equilibria or disequilibria in geochemical modeling;
5. Uncertainties in the thermodynamic data upon which geochemical calculations and modeling is based.

Mine adit flow volumes and decant pond infiltration rates over time also have certain data limitations and uncertainties. Appendix I states that in spite of the uncertainties it is felt that this study is a reliable prediction of post-mine closure water quality and the behavior of metals in the infiltration pond and groundwater system. The reliability of these predictions is bolstered by the empirical evidence of attenuation that has occurred for over thirty years.

The EPA remains concerned, however, about whether the "natural attenuation mechanisms" occurring in impoundment/decant pond sediments and groundwater will continue to function effectively in regard to metals removal or immobilization over the long-term, and/or that at some point immobilized metals may become re-mobilized (i.e., the natural attenuation mechanisms may be reversible). Long-term outcomes with natural attenuation are difficult to predict. What are the Kootenai National Forest's and Montana DEQ's contingency plans in the event that elevated levels of metals or other pollutants are found in groundwater downgradient from the impoundment/decant ponds and/or in Lake Creek at some point in the future after mine closure (e.g., decades into the future)?

It is also not clear to us if long-term water quality monitoring plans are adequate to allow detection of elevated metals levels in groundwater downgradient from the tailings impoundment should that occur in the future. The EPA has published technical guidance documents regarding the use of "Monitored Natural Attenuation" for the remediation of contaminated soil and ground water. EPA uses the term "<u>Monitored</u> Natural Attenuation" to emphasize the need to incorporate adequate monitoring when natural attenuation is relied upon for the remediation of contaminated soil and ground water.

While scientific understanding of natural attenuation processes is increasing, there is still much to be learned regarding the mechanisms governing natural attenuation processes and their ability to address contamination problems, particularly over the long-term. Therefore, while EPA believes monitored natural attenuation may be used where circumstances are appropriate, it should be used with caution commensurate with the uncertainties associated with a particular application. Furthermore, largely due to the uncertainty associated with the potential effectiveness of monitored natural attenuation to meet remediation or treatment objectives that are protective of human health and the environment, <u>EPA expects that long-term performance monitoring must be a fundamental component of any monitored natural attenuation remedy.</u>

Our detailed comments (enclosed) present and discuss EPA technical guidance documents regarding monitored natural attenuation. This technical guidance addresses long-term attenuation capacity and reversibility issues, and long-term monitoring and contingency plans. The EPA recommends that long-term attenuation capacity and reversibility issues, and long-term monitoring and contingency plans be more comprehensively addressed in the FEIS in a manner consistent with the EPA technical guidance documents.

We also note that an EPA contact person regarding monitored natural attenuation is Dr. Rick Wilkin of the EPA Ground Water and Ecosystem Restoration Division in Ada, Oklahoma (phone 580-436-8874). We have discussed the proposed natural attenuation mine water treatment at the Troy Mine with Dr. Wilkin, and he has indicated that he would be willing to discuss Monitored Natural Attenuation and monitoring and analysis needs further with the lead agencies in a telephone conference call if the lead agency staff are amenable to such discussions.

There are also uncertainties associated with the engineered design, operation and maintenance of the six mile pipeline from the underground mine to the decant ponds over the long term. Our detailed comments identify uncertainties and information/data needs for the pipeline, and include recommendations to reduce risk of pipeline leaks and spills. We also recommend that the FEIS provide additional information and clearer disclosure regarding the streams and wetlands that may be crossed by the pipeline, and more complete evaluation and discussion regarding stream and wetland impacts associated with pipeline construction, operation and maintenance.

Finally, it is EPA's understanding that discharge of mine water by infiltration into groundwater beneath the tailings impoundment has been occurring for many years (discharging at up to 1,170 gallons per minute to groundwater hydrologically connected to Lake Creek) without authorization by a Montana Pollutant Discharge Elimination System (MPDES/NPDES permit). Unpermitted discharges are expected to continue post-closure with transport of underground mine water to the decant ponds. While we understand that natural attenuation mechanisms are stated to occur in the decant pond sediments and groundwater that remove and/or immobilize metals, and it does not appear that elevated levels of metals are found in Lake Creek, we recommend that the MDEQ continue to monitor groundwater and Lake Creek, and carefully evaluate whether pollutants may move into Lake Creek via hydrologically connected groundwater in the future, and if so, reconsider the need for a MPDES Permit.

The EPA's further discussion and more detailed questions, comments, and/or concerns regarding the analysis, documentation, or potential environmental impacts of the Troy Mine Revised Reclamation Plan DEIS are included in the enclosure with this letter. Based on the procedures EPA uses to evaluate the adequacy of the information and the potential environmental impacts of the proposed action and alternatives in an EIS, the DEIS has been rated as Category EC-2 (Environmental Concerns - Insufficient Information) due to concerns regarding the long-term effectiveness of proposed mine water natural attenuation treatment and the adequacy of the long-term performance monitoring plan; uncertainties, environmental impacts and risk of spills from construction and operation of the mine water pipeline; and unpermitted mine water discharges to groundwater hydrologically connected to surface waters. A copy of EPA's DEIS rating criteria is attached.

The EPA appreciates the opportunity to review and comment on the DEIS. If we may provide further explanation of our comments please contact Mr. Stephen Potts of my staff in Helena at 406-457-5022 or in Missoula at 406-329-3313 or via e-mail at potts.stephen@epa.gov. Thank you for your consideration.

Sincerely,

Julie A. DalSoglio

Julie A. DalSoglio
Director
Montana Office

Enclosures

cc: Larry Svoboda/Peter Werner, EPA 8EPR-N, Denver
Dean Yashan/Robert Ray/Mark Kelley, MDEQ, Helena

EPA Detailed Comments on the Troy Mine Revised Reclamation Plan DEIS

Brief Project Overview: The Kootenai National Forest (KNF) prepared this DEIS to evaluate revised reclamation activities proposed at the Troy Mine, a copper-silver mine located about 15 miles south of the Town of Troy, Lincoln County, Montana, lying west and north of Bull Lake within the Stanley, Lake, and Ross Creek drainages. The mine permit area covers 2,782 acres of public, private, and patented land. Approximately 57 percent of the project area is on private and patented land, and the other 43 percent is on the KNF. Troy Mine facilities consist of an underground mine, mill, office facilities; the tailings and reclaim water pipelines; a power line; a tailings impoundment; and associated support facilities. The Troy Mine is operated by Troy Mine, Incorporated (Troy Mine, Inc.) formerly known as Genesis, Incorporated. The tailings facility and associated disturbances are located on approximately 430 acres of disturbed area owned by Troy Mine, Inc. Both the tailings and reclaim water pipelines and the power line are on KNF land, private, and patented land. The South Adit portal is located on patented land, while the North Adit portal and the mill and office/shop facilities are located on unpatented claims on the KNF. There are approximately 15.6 acres of disturbed land at the portal patios and 34 acres of disturbed lands at the mill site. Associated roads, pipelines and other small disturbed areas exist throughout the project area.

The purpose of the proposed reclamation plan is to return lands disturbed by mining to a condition appropriate for subsequent use of the area. A 1978 reclamation plan does not meet state or federal requirements for mine water discharge. The need for the revised reclamation plan stems from the need to meet state and federal requirements after mine closure; protect surface and groundwater quality and public health and safety; minimize environmental risk; and restore disturbed lands to productive use. The mining company prepared a revised reclamation plan and the final draft was submitted to the Agencies in March of 2006 (Genesis 2006). The 2006 Revised Reclamation Plan is the subject of this Draft EIS and is referred to as the Proposed Action.

Among the issues addressed in the DEIS are the potential for: discharges of mine water to surface water and exceedance of aquatic life standards; failure of the tailings pipeline potentially resulting in erosion and discharge of contaminants into Stanley or Lake creeks; and issues related to the long-term maintenance of the pipeline. Water Management issues include: 1) Adit closure and mine water distribution; 2) Water treatment and disposal; 3) Groundwater quality; 4) Surface water quality; and 4) Long-term monitoring of water quality. Reclamation issues include: 1) Reclamation materials; 2) Subsidence; 3) Revegetation; 4) Infrastructure (buildings and other structural materials and how they will be removed or reclaimed); and 5) Topography (disturbed areas).

Alternatives considered in detail include a No Action Alternative (the previously approved 1978 reclamation plan), the Proposed Action (Troy Mine, Inc.'s Revised Reclamation Plan), and an Agency-Mitigated Alternative (the Agencies preferred alternative). The DEIS analyzes Troy Mine, Inc.'s revised plan as well as agency-proposed modifications (e.g. adit closure, mine water management, water treatment and monitoring, reclamation cover requirements, subsidence monitoring, debris disposal, and road closures). The major state and federal actions include approval of a reclamation plan and any necessary permits to implement the reclamation activities including construction and long-term monitoring.

Comments:

1. Thank you for including clear descriptions of the alternatives, including identification of the differences between No Action, the Proposed Action and the Agency-Mitigated Alternative, and Table 2-1 (pages 2-19 to 2-35) comparing features of the alternatives in relation to the major issues (i.e., Water Management, Adit Closure and Mine Water Distribution, Water Treatment and Disposal, Groundwater Quality, Surface Water Quality, Long-Term Monitoring of Water Quality, Reclamation, Reclamation Materials, Subsidence, Revegetation, Infrastructure, and Topography). This information improves project understanding and assists in providing a basis of choice among alternatives for both the decision maker and the public in accordance with the Council on Environmental Quality (CEQ) rules for implementing NEPA (40 CFR Part 1500). We also appreciate the inclusion of a clear watershed map in Figure 3-2 (page 3-46) showing locations of waterbodies in the project area in relation to mine facilities. Understanding of the location of waterbodies in relation to mine facilities is critical for environmental impact assessment.

Natural Attenuation Mechanisms for Metals Removal

2. We want to reiterate and expand upon the discussion included in EPA's transmittal letter relating to our most significant concern regarding the preferred alternative (Agency-Mitigated Alternative), which is the long-term plan to discharge mine water draining from the underground workings to the decant ponds within the tailings impoundment after mine closure (page 2-52, ES-16). The preferred alternative proposes to capture mine water that would collect in the underground mine after closure and transport it via a new buried pipeline to the decant ponds at the tailings impoundment for final treatment and disposal in perpetuity. The DEIS states that mine water would be treated at the decant ponds through "natural attenuation mechanisms" as the water infiltrates, allowing metals concentrations to attenuate within the soils (page 3-77, and Appendices C, D, G, and I), such that the Agency-Mitigated Alternative would comply with the Clean Water Act and the Montana Water Quality Act (page 3-90).

   The DEIS states that the effectiveness of the natural attenuation mechanisms in treating mine-related water has been substantiated through monitoring of water at the tailings impoundment for the past 30 years as well as studies directed at understanding the geochemical processes that occur in the underlying soils and groundwater system. Table 3-11, "Groundwater Quality Data for Monitoring Wells at Tailings Impoundment 2000 – 2009" (page 3-59) indicates that antimony and copper concentrations downgradient of the tailings impoundment have consistently met groundwater quality standards; Table 3-9, "Surface Water Quality Data for Lake Creek, 2005 – 2009" indicates that antimony and copper water quality standards have been met at the Lake Creek monitoring station downstream of the impoundment (i.e., groundwater discharging to surface water in the vicinity of the impoundment does not compromise water quality in Lake Creek, page 3-53). The DEIS also states that during active operation of the mine up to 1,170 gpm of the decant pond water seeped through the unlined bottom of the ponds into the underlying aquifer, which is hydraulically connected to Lake Creek, yet elevated levels of metals have not been found in downgradient groundwater or in Lake Creek (pages 3-53, 3-61, 3-77).

Mechanisms for attenuating metals (removing them from groundwater) include dilution, precipitation, adsorption, and co-precipitation (page 3-77). DEIS Appendices D and I provide more detailed information regarding the natural attenuation mechanisms. The Appendix D, "Metals Attenuation Study," indicates that copper was attenuated within the upper foot of soil via the precipitation of secondary copper phases (carbonates, silicates, and oxides) as well as adsorption onto organic matter (Appendix D, page 1). Appendix D also states that should the initial removal mechanisms occurring beneath the decant ponds (i.e., precipitation) become less effective over time, there are additional existing geochemical mechanisms (i.e., co-precipitation and adsorption) capable of removing at least 73-98% of the copper, 11-59% of the antimony, and 35-84% of the uranium from groundwater (Appendix D, page 14).

The Appendix I, "Assessment of Natural Attenuation of Metals in a Decant Pond Disposal System," states that concentrations of metal parameters are much lower in the groundwater than in the mine water/decant pond, evidencing that metal parameters are attenuated (removed) in the groundwater system (Appendix I, page viii). Analyses of sediments in the decant pond reveal that metals are enriched in the sediments, supporting the view that metals attenuated/removed from groundwater are retained in the sediments. Geochemical modeling and lab experiments demonstrate that natural attenuation is provided by the precipitation of iron from mixing of mine water and decant pond water with natural ambient groundwater. Copper, iron, lead, and manganese minerals are oversaturated in mine water and are favored to precipitate from mine water. Appendix I states that precipitation of naturally-occurring iron and manganese in groundwater can significantly reduce the concentrations of arsenic, antimony, copper, lead, and uranium in mine water and decant pond water to levels below human health and aquatic life standards during groundwater transport within a short distance (ten to one hundred feet) of the decant ponds. (Appendix I, pages 1-5, 1-6). The geochemical mechanisms responsible for copper attenuation include primarily the formation of copper minerals and secondarily adsorption by organic matter in soils.

The EPA acknowledges that there is empirical evidence that infiltration of mine water into groundwater beneath the Troy Mine tailings impoundment and decant ponds have apparently not resulted in elevated levels of copper and other metals in groundwater downgradient from the impoundment or in Lake Creek. Although it is not fully clear if all metals and metalloids of potential concern have been adequately evaluated. Monitoring should verify that all metals and metalloids that could potentially be present in mine waters are not present at the Troy Mine (at detectable levels), or if present, determine the concentrations at which they have been found (e.g., Ag, As, Bi, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V and Zn).

The EPA is concerned about the long-term effectiveness of the "natural attenuation mechanisms," since this treatment and disposal system is proposed to occur in perpetuity. We are concerned that there may be a finite capacity for metals removal and/or immobilization, and/or that geochemical conditions may change over time reducing effectiveness of the removal/immobilization mechanisms, or that metals immobilized as precipitated metal compounds in decant pond sediments and groundwater, may become re-mobilized at some point in the future (i.e., the natural attenuation mechanisms may be reversible).

Appendix I states that the longevity of the natural attenuation mechanisms is dependent on the duration of the geochemical conditions conducive to attenuation and to the capacity of the tailing impoundment/aquifer sediments to continue to uptake metals (Appendix I, page 9-2). It concludes that the mineral precipitation and co-precipitation mechanisms are expected to last indefinitely or in perpetuity as long as geochemical conditions remain similar to current conditions. The adsorption mechanisms are conservatively estimated to last a minimum of 600 years.

However, it is also acknowledged that there are limitations and uncertainties regarding the long-term effectiveness of the natural attenuation mechanisms, including (Appendix I, page 1-8):

1. The lack of actual post-closure mine water for evaluation;
2. The lack of the analysis of several metals in some previous investigations;
3. The very low or non-detectable concentrations of some metals;
4. The assumption of chemical equilibria or disequilibria in geochemical modeling;
5. Uncertainties in the thermodynamic data upon which geochemical calculations and modeling is based.

Appendix I states that in spite of these uncertainties it is felt that this study is a reliable prediction of post-mine closure water quality and the behavior of metals in the infiltration pond and groundwater system. The reliability of these predictions is bolstered by the empirical evidence of attenuation that has occurred for over thirty years.

The EPA remains concerned, however, about whether the "natural attenuation mechanisms" occurring in impoundment/decant pond sediments and groundwater will continue to function effectively in regard to metals removal or immobilization over the long-term, and/or that at some point immobilized metals may become re-mobilized. What are the Kootenai National Forest's and Montana DEQ's contingency plans in the event that elevated levels of metals (or metalloids) are found to develop in groundwater downgradient from the impoundment/decant ponds and/or in Lake Creek at some point in the future after mine closure (e.g., decades into the future)?

It is also not clear to us if long-term water quality monitoring plans are adequate to allow detection of elevated metals levels in groundwater downgradient from the tailings impoundment should that occur in the future. The EPA has published technical guidance documents regarding the use of "monitored natural attenuation" for the remediation of contaminated soil and ground water (EPA, Office of Solid Waste and Emergency Response, Directive 9200.4-17P, April 1999). EPA uses the term "Monitored Natural Attenuation" to emphasize the need to incorporate adequate monitoring when natural attenuation is relied upon for the remediation of contaminated soil and ground water.

While scientific understanding of natural attenuation processes is increasing, there is still much to be learned regarding the mechanisms governing natural attenuation processes and their ability to address contamination problems, particularly over the long-term. Long-term outcomes are very difficult to predict. Therefore, while EPA believes monitored natural attenuation may be used where circumstances are appropriate, it should be used with caution commensurate with the uncertainties associated with a particular application. Furthermore, largely due to the uncertainty associated with the potential effectiveness of monitored natural attenuation to meet remediation or treatment objectives that are protective of human health and the environment, EPA expects that long-term performance monitoring must be fundamental components of any monitored natural attenuation remedy.

EPA technical guidance regarding monitored natural attenuation that we draw to the lead agencies attention include:

"Monitored Natural Attenuation of Inorganic Contaminants in Ground Water, Volume 1 - Technical Basis for Assessment" (EPA/600/R-07/139, October 2007, http://www.epa.gov/nrmrl/pubs/600R07139/600R07139.pdf);

"Monitored Natural Attenuation of Inorganic Contaminants in Ground Water, Volume 2 Assessment for Non-Radionuclides Including Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Nitrate, Perchlorate, and Selenium" (EPA/600/R-07/140, October 2007, http://www.epa.gov/nrmrl/pubs/600R07140/600R07140.pdf);

"Metal Attenuation Processes at Mining Sites," ((EPA/600/R-07/092) September 2007, http://www.epa.gov/nrmrl/pubs/600r07092/600R07092.pdf).

See also the EPA website on Monitored Natural Attenuation, http://www.epa.gov/nrmrl/gwerd/gw/mna.html, and note that there is also a publication, "A Citizen's Guide to Monitored Natural Attenuation," EPA 542-F-01-004, April 2001, http://www.clu-in.org/download/citizens/mna.pdf).

These EPA technical guidance documents address long-term attenuation capacity and reversibility issues, and long-term monitoring plans in the context of Tier 3 and Tier 4 analyses. In Tier 3 analysis EPA recommends that long-term capacity and reversibility be specifically investigated. The DEIS states that mechanisms are expected to last indefinitely as long as geochemical conditions remain similar. This may be reasonable, but this type of broad conclusion typically requires a fairly detailed study of bonding/uptake mechanisms of metals in the solid phase and lab-based extractability assessments. It is not clear if the studies identified in Appendices D and I adequately address EPA Tier 3 analysis requirements. Tier 4 deals with the development of a long-term monitoring plan and the development of a contingency plan in case trends revealed by the monitoring data fail to meet expectations. We are including additional discussion of long-term water quality monitoring and Tier 4 analysis in our following comment (comment No. 3).

The EPA recommends that long-term attenuation capacity and reversibility issues, and long-term monitoring and contingency plans be more comprehensively addressed in the FEIS in a manner consistent with the EPA technical guidance documents referenced above.

Long-term Water Quality Monitoring

3. DEIS Table 2-1 (page 2-23) includes information on long-term monitoring of water quality for each alternative, and brief narrative discussion of monitoring is included for each alternative

(pages 2-38, 2-39, 2-45, 2-46, 2-54). The DEIS states that the Agency-Mitigated Alternative includes water quality monitoring of springs in the analysis area to validate the prediction that water quality standards would be met post-closure (page 3-23). However, proposed long-term water quality monitoring is presented in a disjointed manner in the DEIS. The narrative monitoring discussions refer the reader to Table 2-2, "No Action Alternative Groundwater Monitoring Sites and Schedule" (page 2-36, 2-37), Table 2-3, "No Action Alternative Surface Water Monitoring Sites" (page 2-38), and Figure 2-5 "Proposed Surface and Groundwater Monitoring Sites" (page 2-40). The DEIS reader must flip back and forth between the narrative discussions of monitoring for each alternative and Tables 2-2 and 2-3 and Figure 2-5 in an effort to understand proposed long-term water quality monitoring.

It is not clear to us from Figure 2-5 which groundwater monitoring sites are immediately downgradient from the decant ponds at the tailings impoundment, or if these sites are adequate or appropriate groundwater monitoring sites. It is also not clear which pollutant parameters would be analyzed and which analytical methods would be used at each site. It appears that groundwater samples would be collected three times per year (spring, summer, fall, page 2-37), and that the preferred alternative includes a commitment to monitor water quality post-closure for a minimum of five years after mine water discharge actually commences (page 2-54), and/or until the Agencies agree that monitoring is no longer necessary (page 2-23).

We believe a more detailed, comprehensive long-term water quality monitoring plan for groundwater and surface water, particularly for waters downgradient from the tailings impoundment decant ponds, must be disclosed to assure that adequate long-term performance monitoring is incorporated into the natural attenuation treatment plan. This is necessary to assure that the natural attenuation mechanisms continue to be effective in removing/immobilizing metals over the long-term, and that if metals levels increase for any reason, such increases will be identified and detected so they may be mitigated. A contingency plan in case trends revealed by the monitoring data fail to meet expectations is also needed.

We refer the lead agencies to the EPA monitored natural attenuation guidance documents referenced in our comment above for identification and discussion of factors that should be considered in developing a long-term performance monitoring plan for groundwater downgradient from the decant ponds. In particular we recommend pages 18 to 22 in the document, "Monitored Natural Attenuation of Inorganic Contaminants in Ground Water, Volume 1 - Technical Basis for Assessment," EPA/600/R-07/139, October 2007, http://www.epa.gov/nrmrl/pubs/600R07139/600R07139.pdf.

A list of pollutant parameters and proposed analytical methods at each monitoring site along with monitoring frequency should be clearly presented. The monitoring plan should be designed to monitor specific metals of concern. Monitoring parameters that should be considered include metals and metalloids that could be present or of concern in Troy Mine waters (e.g., Ag, As, Bi, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V and Zn). Monitoring should also include other parameters that link to the proposed attenuation mechanisms, such as pH, redox conditions, dissolved oxygen, dissolved organic carbon, and concentrations of major cations (Ca, Mg, Na, K) and anions (SO4, Cl, HCO3), so that geochemical conditions required for natural attenuation can be tracked. Nitrogen parameters (total nitrogen, nitrite+nitrate nitrogen, kjeldahl nitrogen, ammonia nitrogen) should also monitored to evaluate potential presence of contaminants from mine blasting residues.

Monitoring plans should also include well defined triggers that would initiate the implementation of additional evaluation and/or contingency remedial technologies if natural attenuation processes fail to fulfill expectations. Potential chemical and biological monitoring indicators that will be used to signify that natural attenuation treatment may be failing should be identified with trigger values defined. Long-term monitoring plans must be adequate to detect if natural attenuation may be failing at some point, and if monitoring triggers indicate potential failure that should result in follow-up monitoring and investigation. A different reclamation treatment approach may need to be implemented in the event of failure of natural attenuation. Such measures should be incorporated into a monitoring and contingency/corrective action plan.

EPA's Monitored Natural Attenuation technical guidance documents for Tier 4 analysis recommends:

- Select monitoring locations and frequency consistent with site heterogeneity
- Select monitoring parameters to assess consistency in hydrology, attenuation efficiency, and attenuation mechanism
- Select monitored conditions that "trigger" re-evaluation of adequacy of monitoring program (frequency, locations, data types)
- Select alternative remedy best suited for site-specific conditions

We believe some level of monitoring will likely need to be conducted in perpetuity to assure that natural attenuation mechanisms remain effective in perpetuity. Although monitoring frequency can be reduced over time if monitoring results do not evidence contamination (e.g., reduce monitoring to twice per year, then annually, then biennially, etc.). However, some minimal level of monitoring will likely need to be conducted over the very long-term to validate continued effectiveness of natural attenuation. Bonding and financial assurances should provide adequate funding for long-term monitoring, and implementation of an alternative treatment reclamation approach in the event of failure of natural attenuation.

Decant Ponds

4. The DEIS states that copper is attenuated within the upper foot of soil of the decant ponds via the precipitation of secondary copper phases (carbonates, silicates, and oxides) as well as adsorption onto organic matter (Appendix. D, page 1). It is also stated that the decant ponds would be cleaned out periodically (page 2-21). If heavy metals precipitate and accumulate in the upper foot of soil in the decant ponds and ponds are periodically cleaned out, it is not clear to us where the metal laden sediments removed from the decant ponds will be disposed. Disposal of metal laden sediments resulting from the periodic clean out of the decant ponds should be described in the FEIS (i.e., identification of the depository or landfill where metal laden sediments would be taken for final disposal).

Also, is there any potential that the periodic clean out of sediments from the decant ponds will mobilize some pollutants, or over time impair the efficacy of the "natural attenuation mechanisms" and/or pollutant removal efficiency of the decant pond?

5. The volume calculations for infiltration in the decant ponds appear to be based on an oversimplification of the hydrogeology in the area of the decant pond as demonstrated by the tracer tests described in Appendix C. We are concerned about the data limitations and uncertainties associated with decant pond infiltration rates over the long-term. Contingency planning should address this uncertainty.

6. The DEIS states that domestic wells in the vicinity of the tailings impoundment would not be affected (page 3-89). The EPA recommends that the FEIS identify the location and proximity of nearby domestic wells to the tailings impoundment (e.g., wells within a mile).

Nutrients

7. The DEIS states (page 3-58) that if nutrients in shallow groundwater discharge locally to surface water (as they may at the toe ponds) nuisance algal growth could occur, although numeric exceedances for the aquatic life standard for ammonia or for the human health standard for nitrate plus nitrite are not observed in the toe pond water quality data. Nonetheless, the DEIS states that nitrate plus nitrite levels may be high enough at times to promote nuisance algal growth in the toe ponds. Table 3-11 shows ammonia levels as high as 4.2 mg/l in groundwater (MW95-4) and nitrate+ nitrite levels as high as 1.19 mg/l. Table 3 in Appendix F (Appendix F, page 11) shows decant pond water ammonia levels from 4.4 to 11.2 mg/l, Nitrate+nitrite N from 14.5 to 37.6 mg/l; Mine water disused area ammonia levels of 0.39 mg/l and Nitrate+nitrite of 7.4 mg/l; and Adit discharge ammonia levels of 2.33 mg/l and Nitrate+nitrite of 7.99 mg/l. Currently, nitrate concentrations in the tailings decant pond water range between 10 mg/L and 30 mg/L, and concentrations in monitoring wells located close to the decant ponds are similar. However, monitoring wells and the toe ponds downgradient of the tailings impoundment generally have nitrate concentrations of less than 1 mg/L (Table 3-11).

   The DEIS states that after cessation of mining, addition of nitrate to the tailings impoundment would cease (page 3-70), and residual nitrate would slowly be rinsed out of the tailings by precipitation and diluted in the groundwater, and concentrations of nitrate in the underlying aquifer would decline. Nitrate concentrations are expected to decline rapidly after mining ends, as was observed during the interim mine shut-down between 1993 and 2004, because nitrate-rich mine water will no longer be discharged in the tailings impoundment.

   While we agree that nitrogen levels in mine waters discharged to the decant ponds are likely to decline after mining ends there does appear to be potential for elevated nitrogen levels to occur in groundwater and surface waters hydrologically connected to groundwater. It is important to recognize that recent scientific studies have increased concerns about impact of even low levels of nitrogen in surface waters in regard to stimulation of growth of algae and undesirable aquatic vegetation. The Montana DEQ is developing numeric water quality criteria intended to control excessive nutrient (nitrogen and phosphorus) pollution in Montana's streams, rivers, and lakes to assure a level of water quality that will protect the beneficial uses of these waterbodies, (see DEQ website, http://deq.mt.gov/wqinfo/standards/NumericNutrientCriteria.mcpx).

In 2008, DEQ released the report, "Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers" which included draft numeric nutrient criteria that, if achieved, ensure protection of designated uses. The 2008 report proposed a total nitrogen criterion of 0.233 mg/l for the Northern Rockies ecoregion as the concentration that would ensure protection of aquatic life and recreational uses. We recommend that the revised reclamation plan take this science into consideration and that the closure and post-closure monitoring include monitoring for nitrogen parameters and growing season chlorophyll in the long-term water quality monitoring plan so that the response of the algal community to nitrogen loading can be identified and mitigated if need be.

MPDES/NPDES Permits

8. The DEIS states that during active operation of the mine, Troy Mine, Inc. typically uses the tailings impoundment and decant ponds to settle out suspended sediment from the tailings slurry, and then clarified tailings/decant pond water is pumped to the mill circuit via a return line (page 3-60). The DEIS also states that up to 1,170 gpm of the decant pond water seeps through the unlined bottom of the ponds into the underlying aquifer (i.e., or approximately 1.7 million gallons per day). The 2001 Hydrometrics report (Appendix H) indicated that, while deep groundwater and the decant ponds system are hydraulically connected, most of the decant pond water is transported downgradient (towards Lake Creek) via the shallow alluvial aquifer (page 3-61); and it is also stated that groundwater beneath the tailings moves in a westerly direction and eventually discharges to Lake Creek (Summit Envirosolutions 1996, page 3-77).

   It appears, therefore, that discharge of mine water by infiltration into groundwater beneath the tailings impoundment has been occurring for many years (groundwater hydrologically connected to Lake Creek). Such discharges are also proposed to occur after mine closure when underground mine waters will be piped to the decant ponds as the plan for treatment and disposal of mine waters over the long-term. It also appears that the amount of mine water infiltrating into groundwater may potentially increase after mine closure if the discharge to the decant ponds from the underground mine were to be anything close to the maximum pipeline design flow of 6.9 cfs (~3,100 gpm). It is our understanding that existing and proposed discharges of mine water to groundwater hydrologically connected to Lake Creek have been occurring without authorization by an Montana Pollutant Discharge Elimination System (MPDES) permit, and such unpermitted discharges are expected to continue post-closure.

   While we understand that natural attenuation mechanisms are stated to occur in the decant pond sediments and groundwater that remove and/or immobilize metals, and it does not appear that elevated levels of metals are found in Lake Creek, we recommend that the MDEQ continue to monitor groundwater and Lake Creek and carefully evaluate whether pollutants may move into Lake Creek via hydrologically groundwater in the future, and if so, reconsider the need for a MPDES Permit.

303(d) Listed Streams and Total Maximum Daily Loads (TMDLs)

9. The discussion of exceedances of copper water quality standards in upper Stanley Creek indicates that the source(s) of these exceedances may be due to several factors, including sediment generated from surface water erosion of naturally copper-bearing soil, groundwater seeping from the mine void, erosion of copper-bearing soil from the portal patios, or groundwater containing naturally-elevated copper concentrations from mineralization in the area (page 3-85). The DEIS states that the occasional low-level naturally-occurring copper exceedances in upper Stanley Creek would be expected to continue through post-closure for all alternatives. There have historically been numerous detections of copper in Fairway Creek despite the Fairway site being upgradient of the mine. The DEIS indicates that the most likely reason for these detections is that copper occurs naturally in the region and is present in soils and sediment.

   The MDEQ's Clean Water Act 303(d) listing website (http://cwaic.mt.gov/query.aspx) lists Stanley Creek as water quality impaired (from headwaters to confluence with Fairway Creek, 4 miles, MT76D002_010) with only partial support for aquatic life and cold water fishery uses with probable causes listed as unknown, copper, nutrients, and biological indicators, and probable sources listed as mine tailings and streambank modifications/destabilization. If natural sources of copper in the Stanley Creek drainage are believed to be causing water quality standards exceedances rather than mine tailings, it would be appropriate to revise the information on the MDEQ 303(d) listing website for Stanley Creek accordingly.

   Similarly the disclosure of Lake Creek water quality in Table 3-9 (page 3-53) suggests potential for only low level exceedances of copper water quality criteria. This table does not include identification of cadmium, lead or mercury levels, which are among the listed pollutants causing water quality impairment for Lake Creek on MDEQ's Clean Water Act 303(d) website. Lake Creek is listed as water quality impaired (Bull Lake outlet to mouth, 17.6 miles, MT76D002_070) with only partial support for aquatic life and cold water fishery uses, and no support for drinking water use, due to cadmium copper, lead, mercury and zinc, nitrate/nitrite, and sedimentation from mine tailings, natural sources, and forest roads.

   It is also worthy of note that the DEIS states that copper and antimony are the constituents of concern (page 3-50) because they have exceeded water quality standards for surface water in the mine water (i.e., copper concentrations averaged 0.041 mg/L and antimony concentrations have averaged 0.010 mg/L during mine operations; and during an interim shutdown copper concentrations were somewhat higher, averaging 0.059 mg/L, and antimony concentrations averaged 0.011 mg/L (Table 3-7, page 3-51). However, copper, cadmium, lead, mercury and zinc are listed by MDEQ as the probable causes of Lake Creek water quality impairment, but the MDEQ website does not identify antimony as a probable cause of impairment. Table 3-7 in the DEIS does not identify cadmium, lead and mercury levels in mine waters.

   The DEIS discussion of metals levels in Stanley and Lake Creeks appear, therefore, to be disconnected from the MDEQ's water quality impairment listings. It will be important that further evaluation of water quality impairments in Lake Creek and Stanley Creek and their magnitude and causes take place early in the development of the TMDL's for Stanley and Lake

Creeks. It will also be important the Troy Mine long-term reclamation plan be consistent with the development of TMDLs to improve water quality and restore full support for designated uses in these waterbodies.

Pipeline Design

10. As noted earlier, the Agency-Mitigated Alternative proposes constructing and burying a new pipeline that would transport water from the underground mine (Service and Conveyor Adits) to the decant ponds at the tailings impoundment instead of using the existing tailings pipelines (page 3-80). The DEIS indicates that the new pipeline would include a leak detection system and be double-lined at creek crossings to minimize the potential of discharge directly to streams (page 3-80). It is important that attention directed at reducing risk of pipeline leaks and spills, since we understand that there have been past tailings pipeline spills at the Troy Mine that have resulted in elevated metals levels in surface waters.

    Appendix G provides information on the conceptual design of the proposed new pipeline. It is stated that the pipeline would follow the existing tailings/slurry pipes, approximate the land gradient, and have the hydraulic capacity to handle all of the estimated peak discharge of 6.9 cfs under gravity flow (Appendix G, page 2). The volume of flow over time after closure as provided in Appendix C appears to be a rough estimate. What are the provisions for collecting additional information for input into the final engineering design for the pipeline? For example, as the groundwater flow fluctuates seasonally, a design flow based upon averages is not robust and additional data will be needed before final design. The analysis of discharge is based upon existing operating conditions rather than closure conditions, and appears to be based on a simplification of the groundwater fracture flow conditions at the mine site. We recommend that the pipeline be designed for the highest forecasted flow over the timeframe that it will be used, not the "extreme event of over a ten-year recurrence interval" as stated in Appendix C (page 4). Also, if the water pressure may fluctuate, those fluctuations also need to be taken into account. Pipeline design considerations for freeze/thaw and for stability with steep slopes and transitions from steep to gentle slopes are not well described.

    We recommend burying the pipeline at a depth below the freeze level across the entire width of the stream, meander zone, and active floodplain, such that if there is any stream movement the pipe is not exposed to erosive action of bedload and debris in moving water. In addition, we recommend consideration of using a secondary sleeve similar to how water supply pipes are often put in at stream crossings, so in case there is a leak under the stream the pipe can be replaced by removing old pipe and inserting new pipe into the sleeve without disturbing the stream again - the sleeve can be placed using a boring system or a trench. Also, if the pipe is to be hung over the stream or gully, it should be high enough to clear any substantial flood (FEMA a 100 year flood is reasonably foreseeable). Additional valving should also be considered at major slope transitions where they may be a higher likelihood of pipeline failure (e.g., transitions from 12% slope).

    Appendix G suggests that smooth HDPE pipe may be used, in which case pipe corrosion is likely not a concern (i.e., sometimes installation of a casing pipe around a metal pipeline at crossings of rivers may actually increase the probability of a spill at or near a river or stream, since air and moisture accumulation between the casing and pipe has potential to aggravate pipe corrosion, but this should not be a concern with HDPE pipe material). Other measures that the lead agencies and company may want to consider to reduce risk of a pipeline spills or leaks include:

-Locate pipeline as much as possible away from streams and wetlands, and minimize pipeline crossings of streams and wetlands

-Pipeline valving shut-off arrangements that limit the magnitude/volume of a spill at any one time (periodic block and check valves). Mainline block valves and check valves located upstream and downstream of river/stream crossings to allow stoppage of flow should leaks or pipeline damage occur at river and stream crossings, and additional valving is also recommended at major slope transitions where they may be a higher likelihood of pipeline failure.

[We note that Appendix G states that the static capacity of the pipeline is about 250,000 cubic feet (~1.87 million gallons), which is the maximum amount of mine water that could drain from the pipe should a break occur at its lowest point (Appendix G, page 2). It is also stated that this amount could be reduced with the addition of automatically controlled valves along the length of the pipeline, but this design feature was not incorporated into the design. <u>We recommend that additional automatic valving be incorporated into the design to reduce potential spill volumes.</u>]

-Increase pipeline thickness at stream crossings.

-Use cathodic protection along the entire length of pipeline or coat pipeline with a minimum of 8 mils of fusion bonded epoxy coating (FBE), 6 mils of copolymer adhesive, and 40-75 mils of high density polyurethane (HDPE) to protect the pipe from corrosion (if metal pipe were used).

-Use state-of-the art "smart pig" system to detect deformities on the inside of the pipe, and"smart pig" internal pipeline inspections within three years of the initial hydrostatic pipeline testing, and schedule subsequent periodic inspections (e.g. every two years) to reduce the risk of undetected deformities causing spills.

-Regular hydrostatic testing to evaluate pipeline integrity during operations.

-Have a Contingency Plan and Emergency Response plan for the pipeline, containing information on spill response procedures to be followed and actions to be taken in the event of a spill. The Plan also should identify the specific procedures to mitigate potential adverse environmental impacts (i.e., on surface water, ground water, soils, fisheries, wildlife, recreation, human health and safety) and discuss the location of equipment and expertise available to each length of the route to respond to environmental cleanup. Special conditions such as weather impaired and cold weather response procedures should be included.

11. The DEIS states that an average of 2.3 cfs of water is displaced from the mine workings to areas (e.g., the decant ponds) more distant from the mine (page 3-67). How does the reference to 2.3

cfs being displaced from the mine workings to the decant ponds relate to the range of flows estimated between 300 gpm (0.67 cfs) to 3100 gpm (6.9 cfs) being directed from the underground mine workings to the decant ponds (page 3-76)?

12. The reclaim water line is proposed for use after mine closure as an emergency line for transport of mine adit discharge in the event of a leak in the new buried pipeline (Appendix G, page 2). However, it stated that the reclaim water line will only handle approximately half of the estimated maximum 6.9 cfs under gravity flow conditions (Appendix G, page 3). It is also stated that the reclaim water line could handle the full estimated flow if it is retrofitted with appropriate vacuum relief and pressure relief valves. We recommend that the reclaim water line be appropriately retrofitted to allow it to handle the highest potential flow over the timeframe that it will be used.

13. The DEIS states that no activities are proposed under any alternative that would discharge fill materials into water bodies or that would impact wetlands (page 3-91), however, since there are statements that the proposed pipeline would be double-lined at stream crossings (page 3-80), it leads us to believe that there will be pipeline stream crossings, and there may be potential for stream impacts during pipeline construction, and/or impacts to wetlands which are often associated with streams. Figure 1 in Appendix G includes a map with a proposed pipeline routing, but streams and wetlands are not clearly depicted on this map. We did not see clear disclosure of the number of streams and wetlands acreage that may be crossed. The EPA recommends that the FEIS clearly disclose the number of streams the pipeline may cross and if it would cross any wetlands, and more fully evaluate and discuss potential stream and wetland impacts associated with pipeline construction.

    There may also be potential for disturbing wet areas during removal of stockpiled soils below the toe ponds for use in tailings impoundment reclamation (page 3-214). Areas of disturbance from this activity should be assessed for the presence of, and potential impacts to, wetlands.

    We also encourage the lead agencies and Troy Mine, Inc. to contact Mr. Todd Tillinger of the U.S. Army Corps of Engineers, Montana Office in Helena at 406-441-1375 or Ms. Christina Schroeder of the Corps of Engineers, Missoula Office at 406-541-4845 extension 328, to determine applicability of Clean Water Act Section 404 permit requirements to proposed pipeline and other mine reclamation construction activities in or near streams or wetlands. We also note that other federal, state and local regulatory requirements may be needed for project implementation should construction activities occur in or near streams and wetlands (e.g., Montana Section 318 turbidity exceedance authorizations, Clean Water Act Section 401 certification, Montana 310 permit requirements, Montana Stream Protection Act 124 permits, etc.).

    The Council on Environmental Quality (CEQ) regulations for implementing NEPA state that federal agencies shall to the fullest extent possible integrate the requirements of NEPA with other planning and environmental review procedures required by law or by agency practice so that all such procedures run concurrently rather than consecutively (40 CFR 1500.2(c)). To ease the administrative burden the Federal and State agencies in Montana have developed a single permit application for the various potential permits or authorizations that may be needed (http://dnrc.mt.gov/permits/default.asp , http://dnrc.mt.gov/permits/streampermitting/joint_application.asp). Also a Montana Stream Permitting Guide is available to explain the various permitting authorities http://dnrc.mt.gov/permits/streampermitting/guide.asp.

Drainage Channels:

14. In the Agency-Mitigated Alternative, all drainage channels would be built from imported rock rather than from mine development rock to further minimize the potential for near-neutral metal mobility (page 3-40). EPA agrees with and supports the use of rock with low metal leaching or mobility potential for drainage channel construction. The source of this imported rock, however, is not identified. What is the source of the imported rock, and are there any adverse environmental impacts associated with collecting and transporting the imported rock to drainage channel construction sites?

Geochemistry of New Ore Zones

15. Is it expected that the ore zones to be mined in the future will have a geochemistry similar to the ore zones mined in the past, and thus, confirm that metals leaching predictions for the future can be reliably predicted on prior experience and observations? We recommend that the geochemical testing and evaluation methods that will be used to confirm that the new ore zones will be analogous to the previously mined areas be identified and described in the FEIS.

Flow Reduction

16. Reduction in groundwater flows to Ross and Stanley Creeks, especially Stanley Creek, are identified as a water quantity impact caused by pumping underground mine water to the decant ponds (page 3-80). However, the extent of surface water flow reduction is not quantified or estimated, and potential impacts on aquatic life associated with this reduction in streamflow in Stanley Creek are not identified. The DEIS states that changes in surface water flows and locations are expected to be minimal after mine closure because discharges are not expected to vary measurably at the surface water monitoring sites and because the potential for new, higher elevation springs to develop would be limited. Although it is acknowledged that surface water flows after mine closure would likely remain less than pre-mining flows in the vicinity of the workings (page 3-67).

    We recommend that additional information be provided regarding estimated flow reductions in Stanley Creek, and likely impacts to aquatic life associated with such streamflow reductions (e.g., estimates of pre-project baseline streamflows or ranges of flow vs. post-closure streamflows or ranges of flow; estimates of potential impacts to aquatic life associated with flow reduction). If such information is not available we recommend that the direction in 40 CFR 1502.22 be followed for incomplete or unavailable information.

17. EPA also suggests that regular multi-spectral aerial photography be used to monitor for presence of new springs, loss of springs, and changes in habitat and vegetative cover in and around aquatic

systems. Preparation of a baseline conditions map is recommended to assist in future comparisons. The company should also clarify how trends will be determined and reported.

Roads

18. We appreciate the inclusion of road improvement, reclamation and decommissioning activities in the Agency-Mitigated Alternative to reduce potential over the long-term for road sediment transport to surface waters and reduce road maintenance costs (Table 2-1, pages 2-30 to 2-32). We are pleased that the Agency-Mitigated Alternative would result in the passive decommissioning of 3.8 miles of road and the active decommissioning of 2.7 miles of road (page 3-120); existing roads would be improved to USFS specifications and 6 miles of paved surface on NFSR 4626 would be replaced with gravel (page 3-134). Roads that are not needed would be ripped, covered with reclamation materials, and revegetated. The Agency-Mitigated alternative would implement BMPs on 19.2 miles of road needed for long-term access (includes stored service work) and decommissions 6.5 miles of unneeded road, thereby reducing long-term road maintenance costs as compared to the Proposed Action. Private roads on Troy Mine, Inc. property at the tailings impoundment would be field reviewed by the Agencies to decide if they are needed for post-mine land uses. We are pleased that this road stabilization work would be carried out and decrease long-term sediment delivery to Stanley and Lake Creeks in comparison to the existing conditions and the Proposed Action (pages 3-88, 3-89).

Other

19. Will the decant ponds and their metals levels present hazards to wildlife, including birds? Is there a need to keep the decant ponds fenced to prevent wildlife entry to these treatment ponds after mine closure?

20. In regard to the allegations that 55 gallon drums were buried in the impoundment years ago by ASARCO (page 2-16), was it ever determined where those drums were buried and what was contained in them? Were the drums ever found and removed?

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements

Definitions and Follow-Up Action*

Environmental Impact of the Action

LO - - Lack of Objections: The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC - - Environmental Concerns: The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO - - Environmental Objections: The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU - - Environmentally Unsatisfactory: The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 - - Adequate: EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 - - Insufficient Information: The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 - - Inadequate: EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.